

**Isochoric p-ρ-T Measurements on {x CO<sub>2</sub> + (1-x) C<sub>2</sub>H<sub>6</sub>, x=0.25, 0.49, 0.74}  
from 200 to 400 K at Pressures to 35 MPa**

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The pressure-density-temperature (p-ρ-T) relationships were measured for binary mixtures containing carbon dioxide (CO<sub>2</sub>) and ethane (C<sub>2</sub>H<sub>6</sub>). Temperatures ranged from 200 K to 400 K with pressures up to 35 MPa. Measurements of p-ρ-T were conducted on compressed gaseous and liquid samples with the mole fraction compositions {x CO<sub>2</sub> + (1-x) C<sub>2</sub>H<sub>6</sub>} for x = 0.252, 0.492, and 0.740. These mixtures were prepared gravimetrically to match, within 0.001 mole fraction, the compositions of three mixtures which were used in a previous density study carried out at Texas A&M University. The purpose of this work was to verify the previous results, and so overlapping ranges of temperature and pressure of the previous effort were used. The results of the two sets of measurements matched quite well.

In the present work, determinations of saturated-liquid densities were also made by extrapolating each isochore to the saturated-liquid pressure and determining the temperature and density at the intersection. For the p-ρ-T apparatus used in this study, the uncertainty of the temperature is 0.03 K, and for pressure it is 0.01 % at p > 3 MPa and 0.05 % at p < 3 MPa. The principal source of uncertainty in density is the cell volume (28.519 cm<sup>3</sup>) with a standard uncertainty of 0.003 cm<sup>3</sup>. When all components of experimental uncertainty are considered, the expanded relative uncertainty (with a coverage factor k=2 and thus a two-standard-deviation estimate) of the density measurements is estimated to be 0.05 %.